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Understanding International Scientific Expert Work
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Understanding International Scientific Expert Work

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INTRODUCTION

Increasingly, individuals interact with colleagues who are geographically far removed from their own workplace. Information and communication technology has enabled cooperation by people from multiple donor support bases to address social issues that affect the world community. Such bases are generally made up of a combination of national governments, UN-systems, and other non-government and community multi-skilled networks whose common goal is the strengthening of a civil society. Scientists frequently participate in such networks and so contribute a great deal to modern life. Yet they are often portrayed on film and television as irresponsible or dangerous, absentminded or eccentric, or as superheroes or super sleuths. These images are very different to the professional scientists whom we've observed over many years. In a world that is increasingly dependent upon scientific and technical expertise to solve its problems, it is important to understand how scientific expert work is conducted in the global context. As yet no such research has been conducted.
This research will investigate the reality of the work of a group of international scientific experts, namely the scientific directors of the accredited anti-doping laboratories. The work of anti-doping scientific experts was chosen as a domain for the research because doping in sport is a global public issue, because scientific work underpins anti-doping programs through chemical analyses for the use of banned substances by athletes, and because scientific expertise is necessary to achieve accreditation. The research will also look at how these scientists stay experts in the rapidly changing context in which they work. We hope that our research will shed light on the nature of the work of scientific experts working in this and other socially oriented global contexts.

RESEARCH DESIGN

Our research aims to identify factors that affect the work of international scientific experts in anti-doping programs by posing questions about what international scientific experts really do, what challenges they meet in the course of their work, and how international scientific experts stay 'expert'.

In addition to public documentation, data will be collected from the scientific directors themselves and other stakeholders in the anti-doping community using surveys, interviews, and focus groups. The initial plan for the research consists of five stages. The first stage focused on the development and conduct of a voluntary survey of a small number of scientific directors in order to identify their perceptions about their work, the international context of their work and the manner in which they maintained their expertise. The second stage employed the results of the first stage to focus and frame a semi-structured interview schedule with other willing participants in order to extend and clarify the issues raised in the first stage. It also included attendance at the Manfred Donike Workshop in Cologne to provide a better understanding of the international context of anti-doping knowledge work. In the third stage, we plan to make use of groups of willing scientific directors to discuss the general issues that became apparent in the results of the second stage. These groups will be conducted as teleconferences or face-to-face meetings. In the fourth stage, selected stakeholders working in the antidoping area will be questioned about their perceptions of the role, contribution and work of the scientific directors using a semi-structured telephone or face-to-face interview. During the final stage of the research, groups of willing scientific directors will be given the opportunity to review and comment on issues raised by the stakeholders and the project as a whole. The frameworks of Cultural Historical Activity Theory (CHAT or simply Activity Theory) and Communities of Practice will be used to interpret the data and to develop descriptive theory about international scientific expert work.

THEORETICAL BACKGROUND

This research will contribute to the building of new theory to describe the dynamics of international scientific expert work in this and other contexts. The researchers believe that scientific work can be explored by regarding scientific work as a communal activity which has evolved out of and continues to evolve in a particular social and historical context, it is not just about human information processing. Data collected in this project will be interpreted

using emerging knowledge about the dynamics of culturally embedded human thinking and activity generated by Activity Theorists (Engeström, 1987, 1999, 2000; Gregory, 2000; Kontinen, 1999; Leont'ev, 1978; Vygotsky, 1978) and those working with the concepts of Communities of Practice (Wenger, 1998, 2000; Wenger, McDermott, & Snyder, 2002).

Activity Theory

Activity Theory originated in the ideas of psychologists Vygotsky (1978) and Leont'ev (1978) in the early twentieth century. Further developed, extended and applied by Engeström (1987, 1999, 2000), Activity Theory is now a "global multidisciplinary research approach ... which is increasingly oriented toward the study of work and technologies" (Engeström, 2000, p 961). As such, Activity Theory is used to analyse any human activity system noting the system's dependence on its cultural context and its dynamic and evolving nature. Additionally, Activity Theory can be used to develop explanatory theories about real world systems of human activity including work and technologies.

According to Vygotsky, an action consists of a **subject** who uses a **tool** or artifact to do something - the **object** of the activity. Tools can be either a physical for manipulating physical objects and/or psychological tool for influencing others. For example, a scientist uses an instrument to produce data or a manager uses a report to make a decision (Figure 1).

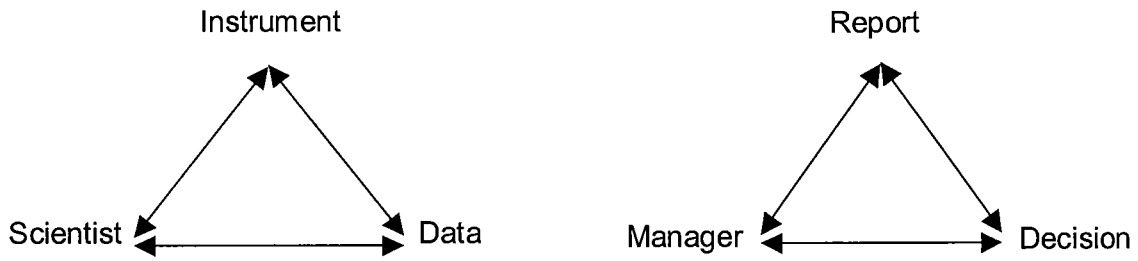

Figure 1: Examples of mediated actions

Engeström expanded Vygotsky's concept by providing a social infrastructure within which an activity occurs. The additional concepts of rules to guide the activity, community to describe the people concerned with the activity's object and division of labour to describe the power and task sharing arrangements within community are represented in Figure 2. These concepts also provided a means of identifying 'contradictions' or 'inner unrests' between the elements of the activity triangle. The resolution of these contradictions facilitates the development of the system.

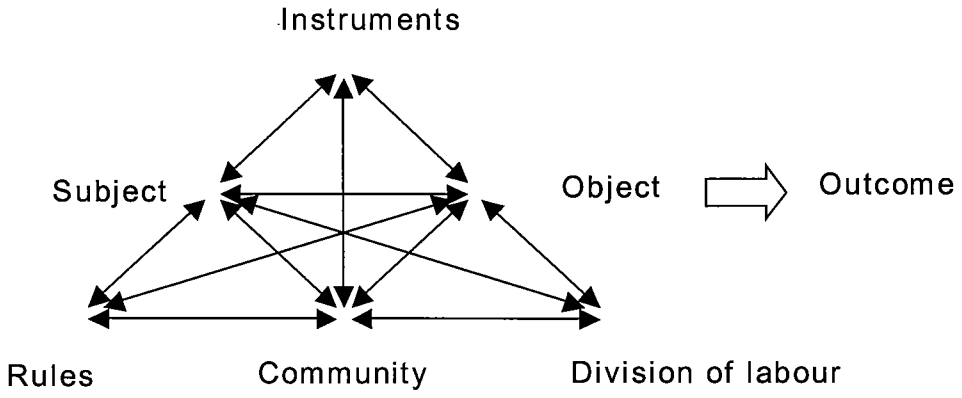

Figure 2: The Structure of human activity (Engeström, 1987, p. 78)

In the context of this investigation into the work of international scientific experts, some of the elements of the Activity might be represented as shown in Figure 3.

Experts, Expertise and Activity Theory

Experts are expected to have an in depth understanding of their subject. They are expected to be at the forefront of their field, to know the most recently generated knowledge, and to constantly 'learn what is not there'. Gregory states that Activity Theory stresses "*expertise as collaborative activity*" (2000, paragraph 9). From an Activity Theory perspective, new knowledge is often a response to a problematical situation that cannot be resolved with existing knowledge or current practices. Engeström refers to such problem solving as 'knotworking' (2000, p.972). Engeström (1987) also states that new knowledge is developed from existing knowledge through 'expansive learning'. Building on the realization that new knowledge is not often generated in a vacuum, Kontinen describes new knowledge as "generated socially in interaction with people and between people and material artifacts" (1999, 'Concept of Expertise: paragraph 7).

Interacting Activity Systems

In her work on understanding and improving cooperation between Finnish and Tanzanian non-governmental organizations on an international development project,
Kontinen used Engeström's framework of interacting activity systems (Figure 4) as a means of understanding the dynamics of the work between the two organisations. In the context of this project there are many more than two scientific experts and organisations that interact because of a shared outcome. For this type of situation Engeström's interacting systems'

model might be extended to produce a model for an "interactivity system" which might look something like Figure 5. The usefulness of such a model will be evaluated by this study.

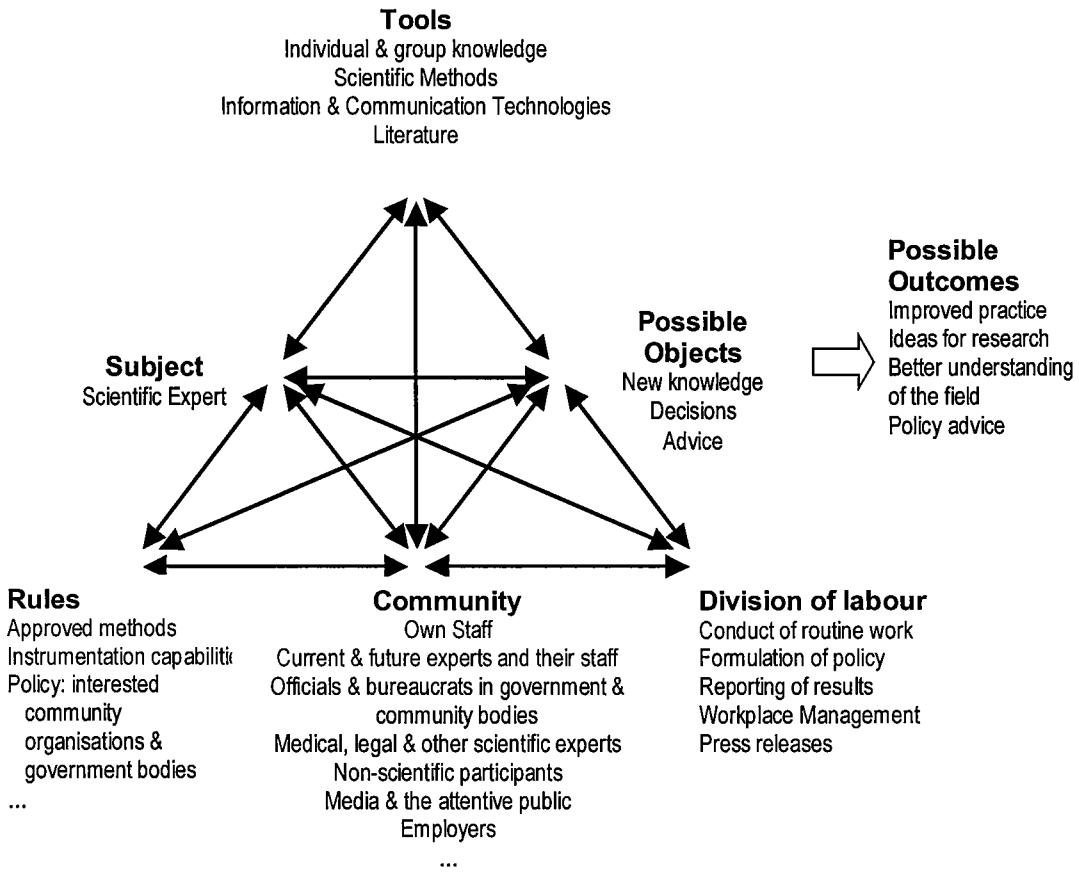

Figure 3: A possible structure for the activity of expert scientific work

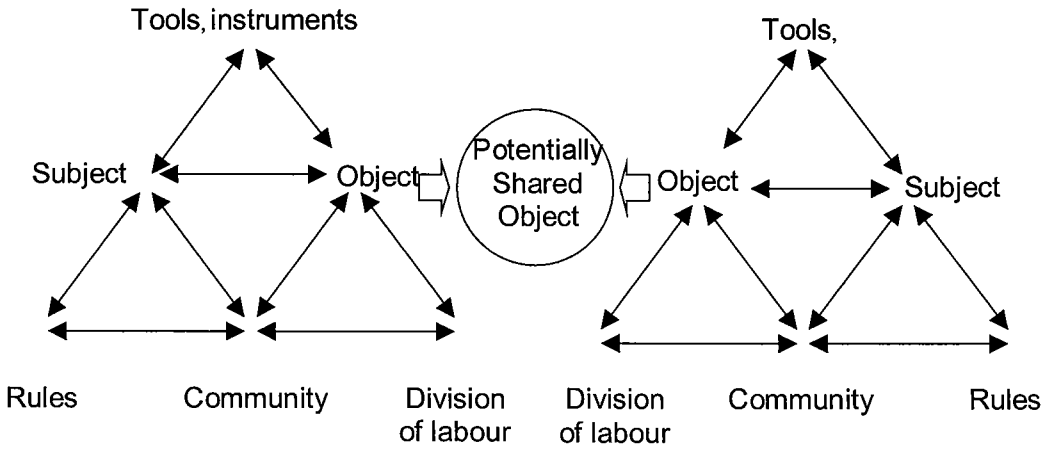

Figure 4: Two interacting Activity Systems (http://www.edu.helsinki.fi/activity/)

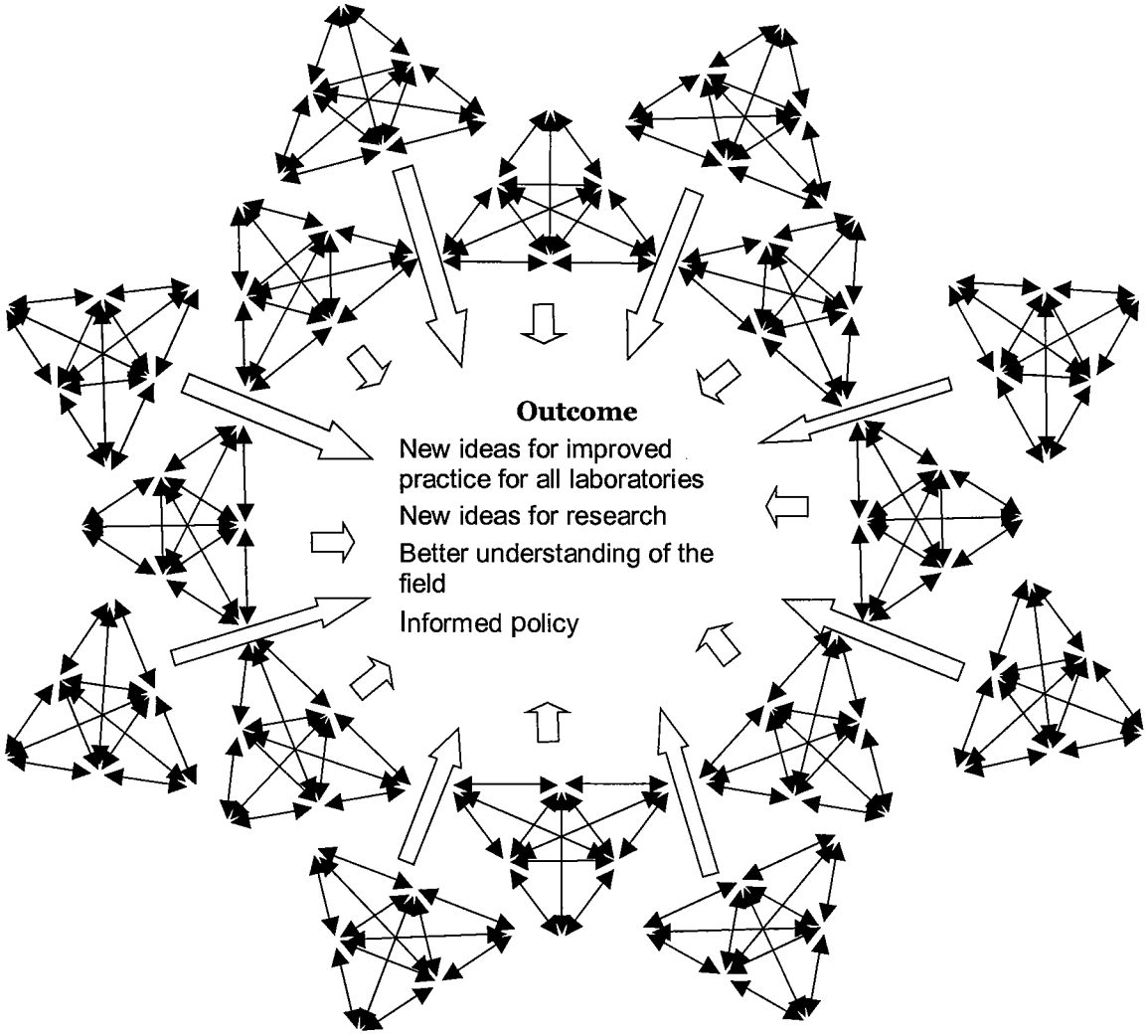

Figure 5: A possible model for a multi-organizational "interactivity system"

Communities of Practice

Krogstie and Krogstie state that "belonging to certain activity systems or communities not only influences the individual's actions, but also the frames of reference employed in interpreting information and developing knowledge" (2002, p. 12). They use the concepts associated with communities of in order to examine the role of the individual expert in an expert community. The research surrounding communities of practice stresses the situational context of work or practice and participation in the lived-in world as a key unit of analysis in a theory of social practice. Wenger refers to "the guilds of the Middle Ages that took on the stewardship of a trade, and scientific communities that collectively define what counts as valid knowledge in a specific area of investigation" (1999, paragraph 4) as examples of

"communities that accumulate collective learning into social practices – communities of practice." (paragraph 4).

Professionals form a community of practice for a variety of reasons. Wenger sees a community of practice as "a group of people who interact, learn together, build relationships, and in the process develop a sense of belonging and mutual commitment" (2000, p. 34). Such communities enable professionals to help each other solve everyday work problems in their discipline. They promote the growth and dissemination of a set of best practices and facilitate the development and stewardship of tools, insights, and approaches needed by community members in field assignments. Communities of practice also cultivate the highly innovative solutions and ideas that enable a community to maintain and advance its expertise (Wenger, McDermott, & Snyder, 2002).

According to Wenger (1998) communities of practice foster the development and stewardship of knowledge relevant to a particular practice through individual, community and organizational learning. Individual learning is facilitated by the engagement of individuals in and contribution of individuals to the community's practices. Community-based learning fosters the gradual refinement of the community's practice over time through knowledge generated within the community or brought in to the community by new generations of members. The organization to which the community of practice belongs, learns when it is provided with the knowledge it requires to perform its functions in an effective manner, thus increasing its value as an organization.

Communities of practice come in all shapes and sizes (Wenger et al., 2002). They can be small or large, short or long-lived, spontaneous or intentionally organized, single or multi-disciplined, single or multi-organizational. They can exist in a single building or in various locations around the world. They may go unrecognized or be institutionalized. Whatever their nature they all have a domain of knowledge, a community of people who care passionately about their domain and a shared practice that they are developing.

Successful communities of practice are not always easy to build. The achievement of a working community of practice within an organization will depend upon that community having a clear definition of its domain, appropriate external support, a rhythm to its activities, internal leadership and varying levels of participation amongst its members (Figure 6). Communities of practice take time to develop and must address many challenges on the way. Wenger et al. (2002) list five evolutionary stages through which communities of practice pass (Figure 7).

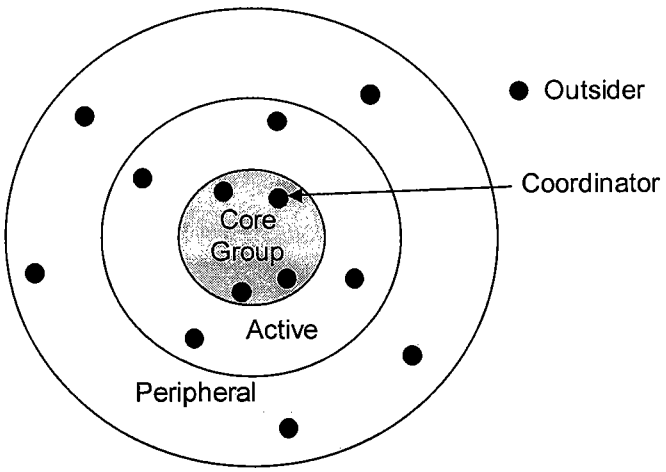

Figure 6: Degrees of community participation (Wenger et al., 2002, p.57)

The jagged line represents the level of energy and visibility that the community typically generates over time.

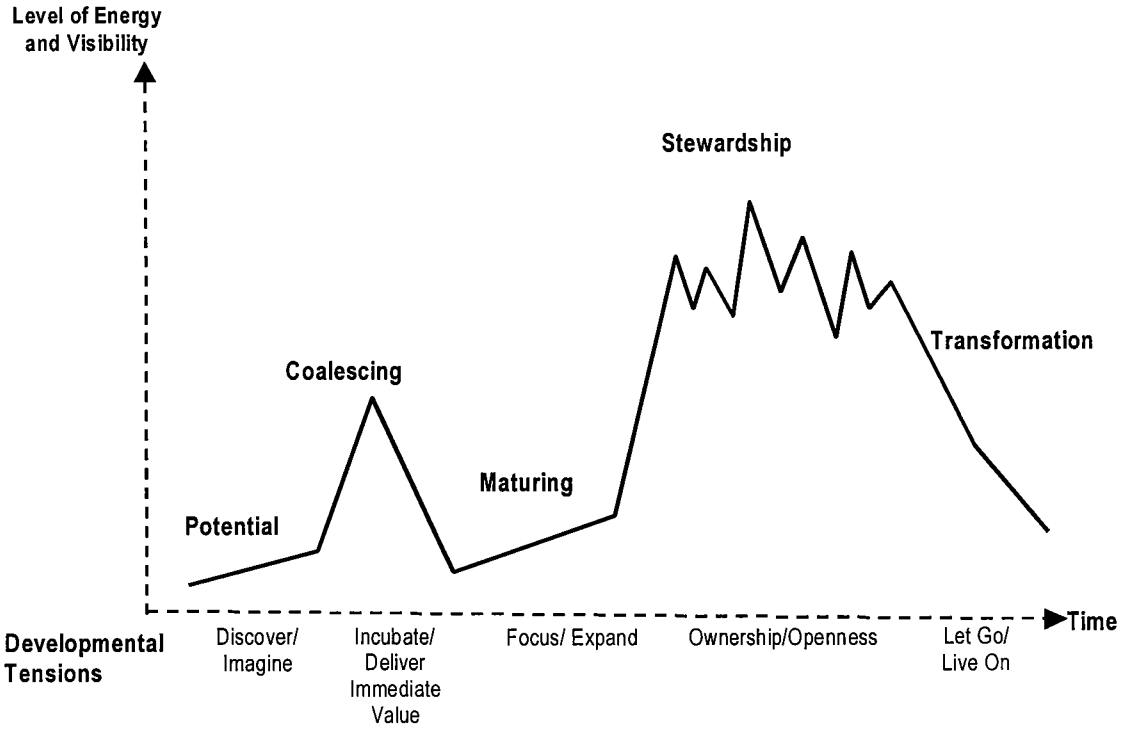

Figure 7: Stages of community development (Wenger et al., 2002, p. 69)

Wenger also sees communities of practice as "the key to the complex knowledge challenges faced by most organizations today" (1999, p.1) . Wenger's knowledge strategy is grouped into four activity streams. The first stream requires the building of a strategic capability framework through the identification of knowledge needs and the formation of communities

of practice who will be engaged by this knowledge. This is followed by the development of a social learning system together with the development of the communities that are focused upon the knowledge needs and their linkage to other communities that may provide fresh insights on this knowledge. The third stage is creation of a knowledge organization that fosters feelings of belonging amongst community members and integration of members' expertise into the community. The final stage consists of the building of an action-learning momentum where the application of the knowledge is assessed, the process is reflected upon and the opportunity for renewal is investigated in the context of organizational transformation.

Wenger's knowledge strategy may provide valuable insights into the evolution of knowledge and the development and maintenance of expertise in the more loosely connected context of international scientific work that is focused upon the achievement of a social goal.

CONCLUSION

Preliminary results suggest that Activity Theory and Communities of Practice do provide 'thinking tools' with which to view the work of international scientific experts (Kazlauskas & Crawford, 2003). They provide a means by which we can become more aware of how work is done, and how knowledge is developed and shared by practitioners.

This case study of the work of the scientific directors of accredited anti-doping laboratories will facilitate an improved understanding of the work of the scientific directors through the identification and improved understanding of the various aspects, challenges and opportunities of international scientific expert work in this context. In doing so, our research will provide an opportunity for the scientific directors of the accredited anti-doping laboratories and their stakeholders to reflect on the current nature and possible future directions of these expert work activities and the context in and through which these activities are carried out. From a broader perspective, our research will lead to a better understanding of and a model for expert scientific work in this and other increasingly complex contexts.

A NOTE OF APPRECIATION:

Our thanks to those in the anti-doping community who have participated or who will participate in this research in the future. Your generosity is most appreciated.

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